JUN 18 1990

FLOOD INSURANCE STUDY

TOWNSHIP OF PENN, PENNSYLVANIA
LYCOMING COUNTY

AUGUST 15, 1990

Federal Emergency Management Agency

COMMUNITY NUMBER - 421848

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision (LOMR) process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS components.

Initial Flood Insurance Study Effective Date: August 15, 1990

Flood Insurance Study Revised:

TABLE OF CONTENTS

		Page
1.0	INTRODUCTION	1
	1.1 Purpose of Study	1
	1.2 Authority and Acknowledgments	1
	1.3 Coordination	1
2.0	AREA STUDIED	2
	2.1 Scope of Study	2
	2.2 Community Description	2
	2.3 Principal Flood Problems	2
	2.4 Flood Protection Measures	4
3.0	ENGINEERING METHODS	4
	3.1 Hydrologic Analyses	4
	3.2 Hydraulic Analyses	5
4.0	FLOODPLAIN MANAGEMENT APPLICATIONS	9
	4.1 Floodplain Boundaries	9
	4.2 Floodways	9
5.0	INSURANCE APPLICATIONS	11
6.0	FLOOD INSURANCE RATE MAP	12
7.0	OTHER STUDIES	12
8.0	LOCATION OF DATA	13
9.0	BIBLIOGRAPHY AND REFERENCES	13

TABLE OF CONTENTS - continued

Page

FIGURES

Figure 1 - Vicinity Map 3

Figure 2 - Floodway Schematic 10

TABLES

Table 1 - Summary of Discharges 5

Table 2 - Regulatory Data 6 - 8

EXHIBITS

Exhibit 1 - Flood Profiles
Muncy Creek Panels 01P-06P

Exhibit 2 - Flood Insurance Rate Map Index and Street Index
Flood Insurance Rate Map

Exhibit 3 - Elevation Reference Marks

FLOOD INSURANCE STUDY
TOWNSHIP OF PENN, LYCOMING COUNTY, PENNSYLVANIA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Township of Penn, Lycoming County, Pennsylvania, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared by Buchart-Horn, Inc., for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-88-C-2626. This work was completed in February 1989.

1.3 Coordination

On December 11, 1985, an initial Consultation and Coordination Officer's (CCO) meeting was held with representatives of FEMA and the township to determine the streams to be studied by detailed methods. The U. S. Geological Survey (USGS) was contacted for statistical data of peak records for the USGS gage near Sonestown.

On September 27, 1989, a final CCO meeting was held with representatives of FEMA, the township, and Buchart-Horn (the study contractor) to review the results of the study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Township of Penn, Lycoming County, Pennsylvania. The area of study is shown on the Vicinity Map (Figure 1).

Muncy Creek was studied by detailed methods for its entire length within the community. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction through February 1994.

Beaver Run, Gregs Run, Sugar Run, and Marsh Run were studied by approximate methods. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and the Township of Penn.

2.2 Community Description

The Township of Penn, located in the eastern portion of Lycoming County, in northeastern Pennsylvania, is bordered by the Township of Shrewsbury to the north, the Township of Moreland to the south, the Townships of Franklin and Davidson to the east, and the Township of Wolf and the Borough of Picture Rocks to the west. The township has a land area of approximately 26.2 square miles; the 1984 population was 764.

The township is primarily rural in nature, with existing development scattered thoughout the township. The elevations in the community range from 660 feet along Muncy Creek at the downstream end of the township, to 1,280 feet in the northeastern portion of the township.

The Township of Penn is located in the humid-continental zone, which is characterized by warm summers and cool winters. The annual precipitation is approximately 41 inches, with a mean annual temperature of 50 degrees Fahrenheit ($^{\circ}$F), as recorded at the Williamsport Station of the National Weather Service. The January mean maximum temperature is 36°F, and the mean minimum temperature is 20°F. In July, the mean maximum temperature is 85°F, and the mean minimum temperature is 60°F.

2.3 Principal Flood Problems

The two most severe floods in the township occurred in March 1952 and June 1972. The most devastating flood was caused by Tropical Storm Agnes in June 1972, for which the estimated return period was

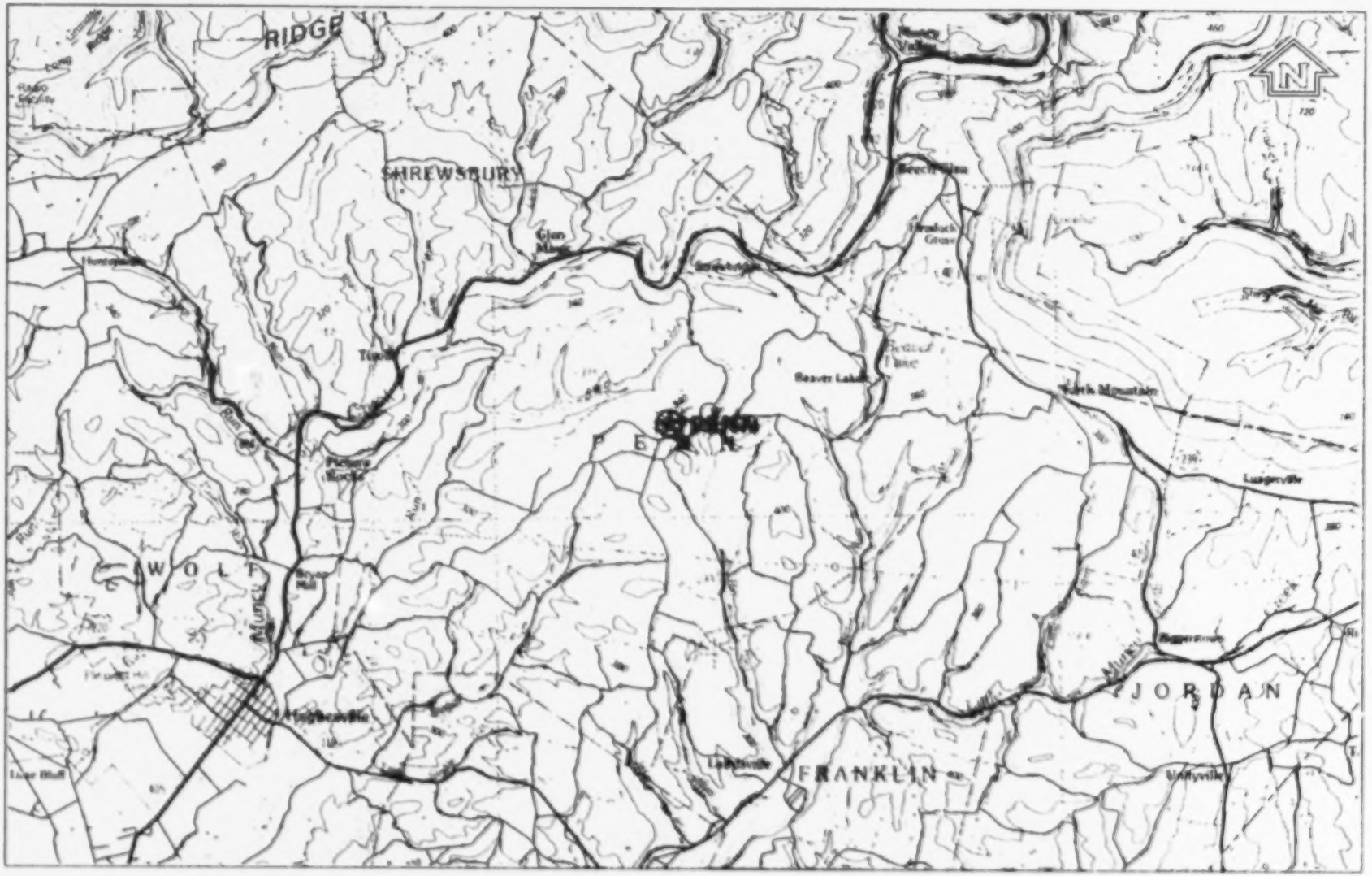


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF PENN, PA

(LYCOMING CO.)

APPROXIMATE SCALE

15 0 15 3 45 MILES

VICINITY MAP

80 years, with a discharge of 8,260 cubic feet per second (cfs). The flood of 1952 had an estimated return period of 60 years and a discharge of 7,310 cfs. These flows were recorded at the upstream Sonestown gaging station (gage No. 552500, with a drainage area of 23.8 square miles).

2.4 Flood Protection Measures

There are no local flood protection measures. Residents of the township rely on the usual warnings through radio, television, and the local newspapers for information concerning possible flood conditions.

3.0 ENGINEERING METHODS

For the flooding source studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. A flood event of a magnitude which is expected to be equaled or exceeded once on the average during any 100-year period (recurrence interval) has been selected as having special significance for floodplain management and for flood insurance rates. This event, commonly termed the 100-year flood, has a 1 percent chance of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for the flooding source studied in detail affecting the community.

The flood-frequency discharge values for Muncy Creek were obtained from a regional flood-frequency method developed by the U. S. Army Corps of Engineers (COE) (Reference 1).

A summary of the drainage area-peak discharge relationships for the stream studied by detailed methods is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGE (cfs) 100-YEAR
MUNCY CREEK		
At downstream corporate limits	80.7	20,500
Upstream of confluence with Rock Run	55.0	15,100

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the source studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross sections for the backwater analyses were photogrammetrically and/or field surveyed and were located at close intervals above and below bridges and culverts in order to compute the significant backwater effects of these structures. The ground control for the photogrammetry was acquired by field surveying and supplemented by analytical control (Reference 2).

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1) and the Flood Insurance Rate Map (Exhibit 2) where applicable.

Water-surface elevations of floods of the selected recurrence intervals were computed using the COE HEC-2 step-backwater computer program (Reference 3). Starting water-surface elevation for Muncy Creek was obtained from the Flood Insurance Study for the Borough of Picture Rocks (Reference 4). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals. The results of the water-surface computations are tabulated for the selected cross sections for each stream segment (Table 2).

Channel roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and were based on field observations and aerial photography of the stream and floodplain areas. Channel "n" values for Muncy Creek ranged from 0.035 to 0.050, and the overbank "n" values ranged from 0.050 to 0.010 (Reference 5).

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

FLOODING SOURCE		STREAM CHANNEL			LEFT OVERBANK			RIGHT OVERBANK			100 YEAR FLOOD WATER SURFACE ELEVATION
CROSS SECTION	DISTANCE * (FT.)	WIDTH (FT.)	DISCHARGE (CFS)	MEAN VELOCITY (FT./SEC.)	WIDTH (FT.)	DISCHARGE (CFS)	MEAN VELOCITY (FT./SEC.)	WIDTH (FT.)	DISCHARGE (CFS)	MEAN VELOCITY (FT./SEC.)	Ft. (NGVD)
A	840	60	16452	7.41	30	74	1.17	300	3974	2.88	681.12
B	1400	65	16876	7.01	275	3624	2.85	40	0	0.36	683.12
C	800	80	17769	9.01	235	2731	3.12	35	0	0	684.54
D	800	120	10800	5.29	305	4205	1.87	570	5495	1.90	686.55
E	360	50	7355	6.47	260	1665	1.68	1000	11480	2.45	686.91
F	960	70	7258	6.55	25	0	0	635	13242	3.88	688.73
G	960	55	11255	6.76	25	0	0	740	9245	3.36	690.33
H	1025	55	7555	6.22	835	12931	2.46	10	14	0.97	696.32
I	990	95	4468	3.73	815	9973	1.59	390	6059	2.17	697.02
J (1)	660	130	8512	6.55	470	7240	2.52	540	4748	2.46	697.23
K	1320	85	14619	10.27	60	11	0.92	610	5870	3.69	699.12
L	920	70	10031	10.10	55	0	0	795	10469	4.82	702.77

(1) DIVIDED FLOW

* Feet between cross sections
Cross section A is referenced from the D/S corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF PENN
LYCOMING COUNTY
PENNSYLVANIA

REGULATORY DATA

MUNCY CREEK

FLOODING SOURCE		STREAM CHANNEL			LEFT OVERBANK			RIGHT OVERBANK			100 YEAR FLOOD WATER SURFACE ELEVATION
CROSS SECTION	DISTANCE* (FT.)	WIDTH (FT.)	DISCHARGE (CFS)	MEAN VELOCITY (FT./SEC.)	WIDTH (FT.)	DISCHARGE (CFS)	MEAN VELOCITY (FT./SEC.)	WIDTH (FT.)	DISCHARGE (CFS)	MEAN VELOCITY (FT./SEC.)	Ft. (NGVD)
M	1080	95	8507	10.08	60	0	0	815	11993	4.45	707.00
N	1560	80	8627	6.32	25	0	0.20	800	11873	3.58	711.50
O	960	80	11547	11.56	55	39	1.88	680	8915	4.58	713.75
P	1240	75	15190	12.13	50	23	1.16	785	5286	3.19	719.25
Q	1240	50	9322	5.91	565	9062	2.86	430	2116	1.82	722.56
R	649	45	8582	5.70	765	6295	2.31	40	223	1.42	725.47
S	1080	155	6351	9.12	465	8743	5.01	0	6	1.35	726.61
T	1480	55	9393	9.21	50	0	0.01	290	5707	4.00	731.59
U	1240	140	8667	13.00	290	2716	4.19	95	3717	7.87	737.89
V	560	95	8999	7.37	360	4120	2.86	140	1981	3.42	742.21
W	1160	200	7566	8.53	465	4246	2.63	50	3288	3.48	745.32
X	1040	130	9684	8.66	520	5304	2.48	55	112	1.69	747.80
Y (1)	1560	115	6833	9.23	795	8146	4.08	35	121	1.73	752.04

(1) DIVIDED FLOW

* Feet between cross sections

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF PENN
LYCOMING COUNTY
PENNSYLVANIA

REGULATORY DATA

MUNCY CREEK

FLOODING SOURCE		STREAM CHANNEL			LEFT OVERBANK			RIGHT OVERBANK			100 YEAR FLOOD WATER SURFACE ELEVATION
CROSS SECTION	DISTANCE* (FT.)	WIDTH (FT.)	DISCHARGE (CFS)	MEAN VELOCITY (FT./SEC.)	WIDTH (FT.)	DISCHARGE (CFS)	MEAN VELOCITY (FT./SEC.)	WIDTH (FT.)	DISCHARGE (CFS)	MEAN VELOCITY (FT./SEC.)	Ft. (NGVD)
Z	1400	80	3009	4.97	735	12063	3.47	30	28	1.16	755.42
AA	1520	65	9725	13.24	545	5221	3.62	0	154	3.25	759.83
AB (1)	1160	120	7245	7.41	135	569	1.84	710	7286	2.70	765.80
AC (1)	720	130	9349	9.56	0	7	1.13	990	5744	2.54	767.52
AD	203	55	6925	4.39	115	126	1.03	635	8048	1.79	778.28
AE	920	55	10920	13.61	30	0	0	290	4180	4.17	777.99
AF	1360	45	7705	8.55	455	3869	2.55	135	3527	3.73	784.28
AG	920	90	9302	7.35	390	5527	3.57	40	272	2.49	786.96

(1) DIVIDED FLOW

* Feet between cross sections

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF PENN
LYCOMING COUNTY
PENNSYLVANIA

REGULATORY DATA

MUNCY CREEK

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the maps; the descriptions of the marks are presented in Elevation Reference Marks (Exhibit 3).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100-year floodplain boundaries to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. For the stream studied in detail, the 100-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24,000 with a contour interval of 20 feet (Reference 6).

For the streams studied by approximate methods, the 100-year floodplain boundaries were delineated using the topographic maps referenced above and the Flood Hazard Boundary Map for the Township of Penn (Reference 7).

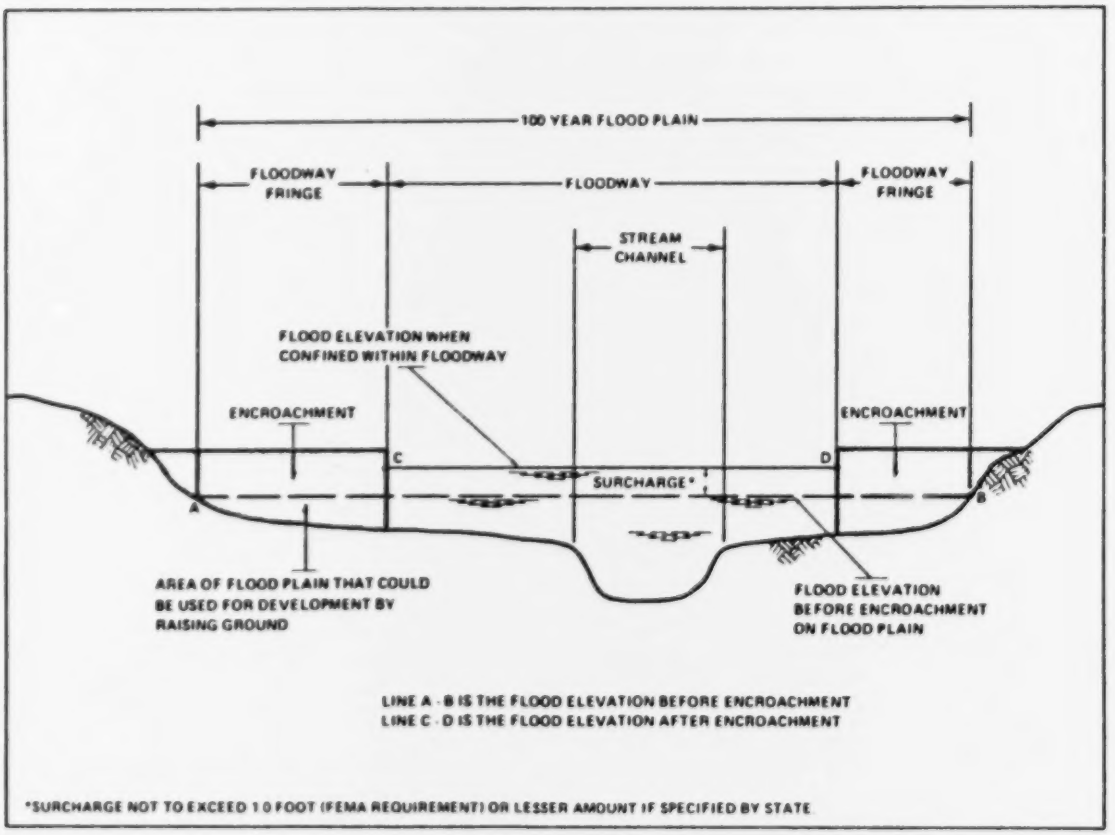
The 100-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE). Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of

the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FLOODWAY SCHEMATIC - Figure 2

No floodways were calculated as part of this study.

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. The zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-depths derived from the detailed hydraulic analyses are shown within this zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, and to areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100-year floodplain. The locations of selected cross sections used in the hydraulic analyses are shown where applicable.

7.0 OTHER STUDIES

Flood Insurance Studies are currently being prepared for the Townships of Davidson and Shrewsbury and the Borough of Picture Rocks (References 8, 9, and 4). The results of those studies will be in exact agreement with the results of this study.

Flood Insurance Studies have been prepared for the Township of Wolf (Reference 10). The results of this study are in exact agreement with the results of that study.

Because it is based on more detailed analyses, this study supersedes the Flood Hazard Boundary Map for the Township of Penn (Reference 7).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA, the Natural and Technological Hazards Division, Liberty Square Building (Second Floor), 105 South Seventh Street, Philadelphia, Pennsylvania 19106.

9.0 BIBLIOGRAPHY AND REFERENCES

1. U. S. Army Corps of Engineers, New York District, Hydrologic Study, Tropical Storm Agnes, New York, December 1975.

2. Pace Aerial Survey, Inc., Aerial Photographs, Scale 1:9,600: Penn Township, Lycoming County, Pennsylvania, February 3, 1988.

3. U. S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Generalized Computer Program, Davis, California, September 1982.

4. Federal Emergency Management Agency, Flood Insurance Study, Borough of Picture Rocks, Lycoming County, Pennsylvania (Unpublished).

5. Ven Te Chow, Open-Channel Hydraulics, New York, McGraw-Hill, 1959.

6. U. S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 20 Feet: Picture Rocks, Pennsylvania, 1970; Sonestown, Pennsylvania, 1970.

7. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Township of Penn, Lycoming County, Pennsylvania, November 1, 1974.

8. Federal Emergency Management Agency, Flood Insurance Study, Township of Davidson, Sullivan County, Pennsylvania (Unpublished).

9. Federal Emergency Management Agency, Flood Insurance Study, Township of Shrewsbury, Lycoming County, Pennsylvania (Unpublished).

10. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, Township of Wolf, Lycoming County, Pennsylvania, Washington, D. C., December 2, 1980.

EXHIBIT 3 - ELEVATION REFERENCE MARKS

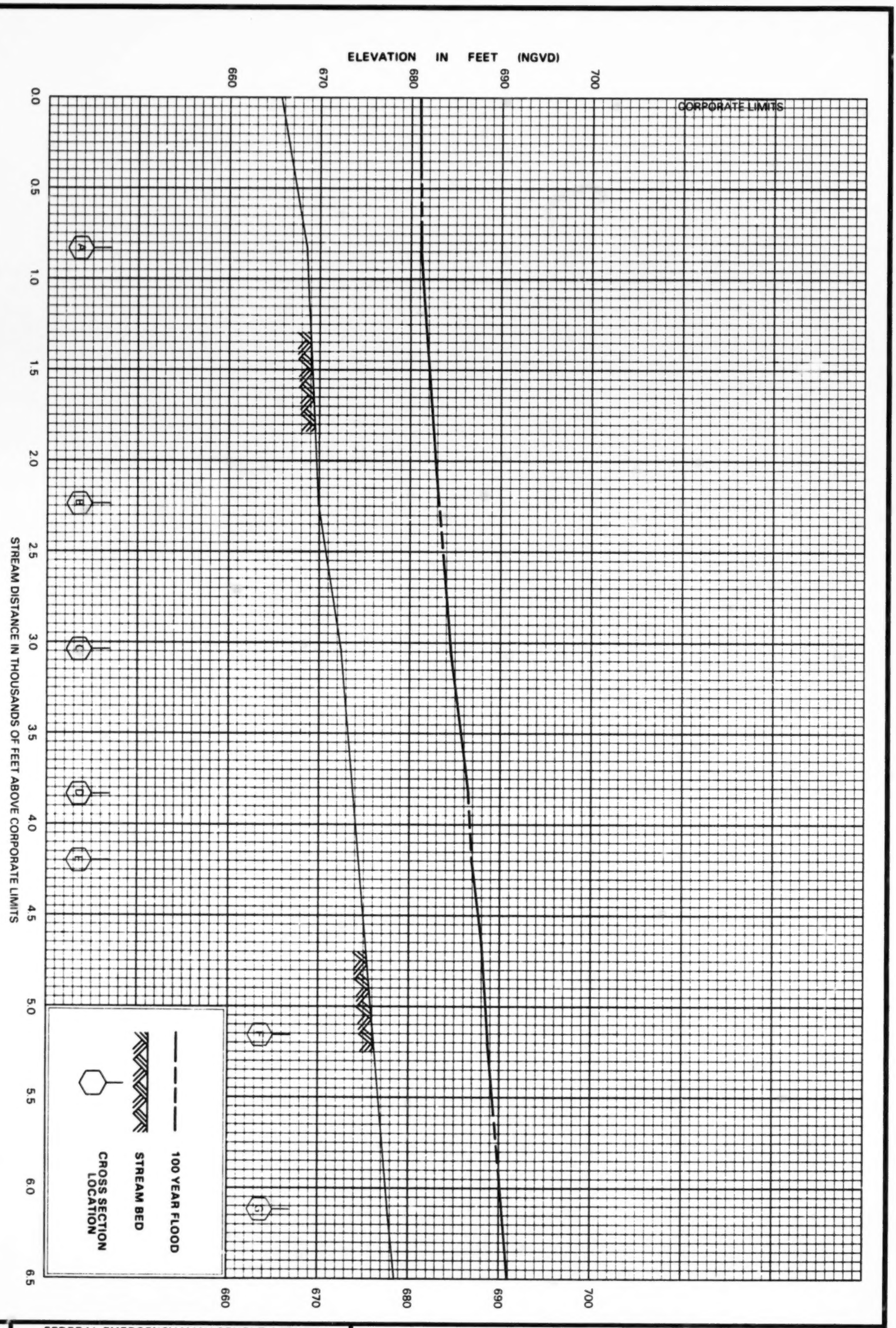
Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 1	03	708.20	Railroad spike in base of power pole No. PP&L 29049/N41180/2001/197, located approximately 0.62 mile southwest of intersection of U. S. Route 20 and State Route 2081 along U. S. Route 220, approximately 1.65 miles northeast of intersection of U. S. Route 220 and State Route 864 along U. S. Route 220, approximately 26 feet southeast of centerline and approximately 425 feet northwest of Marker SR 220 510,520.
RM 2	03	691.62	Standard PDH disk, stamped G 360 1969, on southwest wing wall of bridge over Big Run, approximately 2.2 miles northeast of Picture Rocks post office along U. S. Route 220, in Village of Tivoli, approximately 700 feet southwest of intersection of U. S. Route 220 and State Route 2081 along U. S. Route 220 and approximately 21 feet south of centerline.
RM 3	03	689.92	Railroad spike in base of power pole No. Alltell System 2001/224, located approximately 1,300 feet northeast of intersection of U. S. Route 220 and State Route 2081 along U. S. Route 220, approximately 1,800 feet northeast of Village of Tivoli, approximately 18 feet north of centerline, and between gravel drives to Linray Farms.
RM 4	03	697.93	Standard USGS disk, stamped 6WA PA 1925, vertically set in rock cut, located approximately 2.8 miles northeast of Picture Rocks post office along U. S. Route 220, approximately 200 feet northeast of Marker SR 220 540,550, approximately 13 feet southwest of power pole No. PP&L 671/242/29356/N41601, and approximately 16 feet west of centerline.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 5	04	691.50	Chiseled square on southeast corner of concrete headwall, approximately 0.76 mile southwest of intersection of U. S. Route 220 and State Route 2083 along U. S. Route 220, approximately 950 feet southwest of Marker SR 220 550,560, approximately 17 feet east of centerline and approximately three feet below level of highway.
RM 6	04	715.57	Railroad spike in base of power pole No. 29659/N41809/270, approximately 1,450 feet southwest of intersection of U. S. Route 220 and State Route 2083 along U. S. Route 220, approximately 1,600 feet northeast of Marker SR 220 550,560 and approximately 25 feet south of centerline.
RM 7	04	712.08	Chiseled square on southeast corner of south headwall of bridge over Lick Run, approximately 800 feet northeast of intersection of U. S. Route 220 and State Route 2083 along U. S. Route 220, approximately 1,100 feet southwest of Marker SR 220 570,580 and approximately 13 feet south of centerline.
RM 8	04	711.62	Railroad spike in base of power pole No. PP&L 734/294/29970/N41962, approximately 2,550 feet northeast of intersection of U. S. Route 220 and State Route 2083 along U. S. Route 220, approximately 18 feet south of centerline and approximately 90 feet southwest of farm road south.
RM 9	04	718.46	Chiseled square on southwest corner of sidewalk, located in Village of Glen Mawr, approximately 1,300 feet southwest of bridge over Muncy Creek at east end of Glen Mawr, approximately 550 feet northeast of Marker SR 220 580,590 and approximately 20 feet north of centerline.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 10	04	747.16	Chiseled square on southeast corner of drop inlet, approximately 2,250 feet northeast of Village of Glen Mawr along U. S. Route 220, approximately 65 feet northwest of Marker SR 220 600,610 and approximately 15 feet southwest of centerline.
RM 11	04	756.55	Chiseled square on northwest corner of drop inlet, approximately 0.96 mile northeast of Village of Glen Mawr along U. S. Route 220, approximately 200 feet northeast of intersection of U. S. Route 220 and dirt road northeast, approximately 200 feet northeast of Marker SR 220 610,620 and approximately 15 feet southeast of centerline.
RM 12	08	753.68	Chiseled square on northwest corner of drop inlet, approximately one mile southwest of intersection of U. S. Route 220 and State Route 2085 (Edkin Hill Road) along U. S. Route 220, approximately 285 feet southwest of Marker SR 220 620, approximately 13 feet southeast of centerline and approximately eight feet southwest of power pole No. PP&L 30721/N41998/358.
RM 13	08	785.48	Chiseled square on northeast corner of drop inlet, approximately 1,700 feet northwest of intersection of U. S. Route 220 and State Route 2085 (Edkin Hill Road) along U. S. Route 220, approximately 75 feet southwest of power pole No. 31020/N42088 and approximately 14 feet south of centerline.



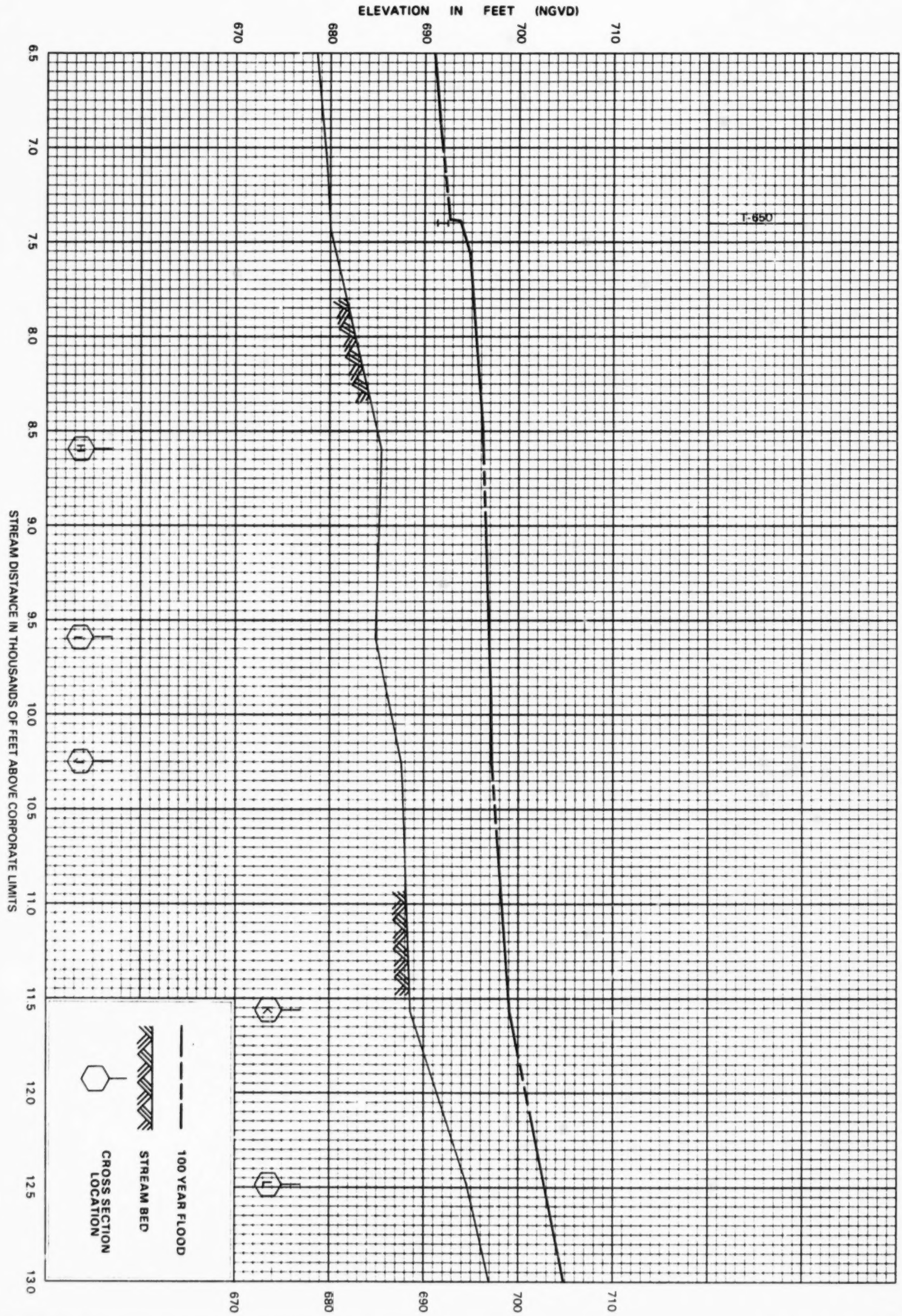
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF PENN, PA
(LYCOMING CO.)

FLOOD PROFILES

MUNCY CREEK

01P



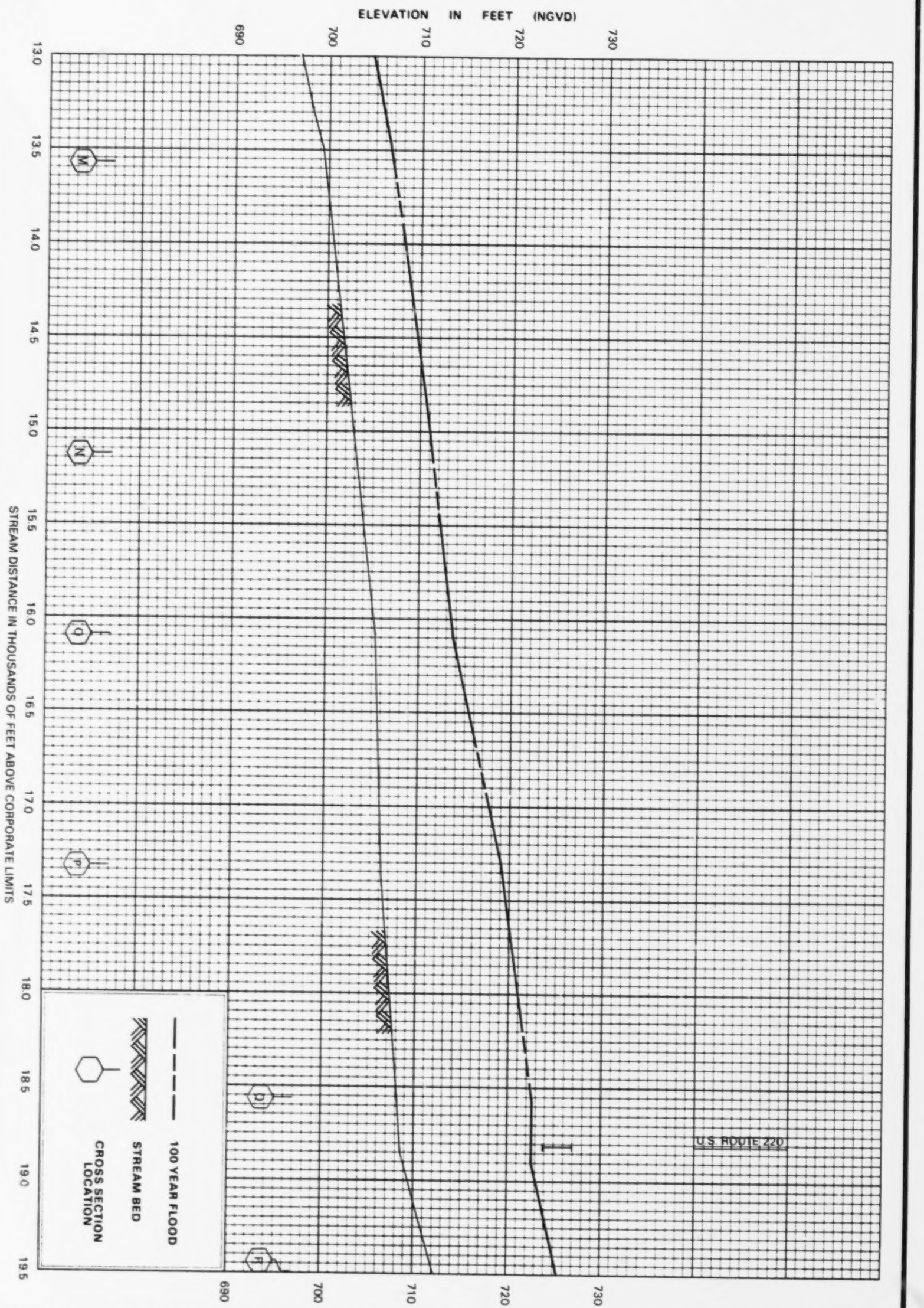
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF PENN, PA
(LYCOMING CO.)

02P

FLOOD PROFILES

MUNCY CREEK



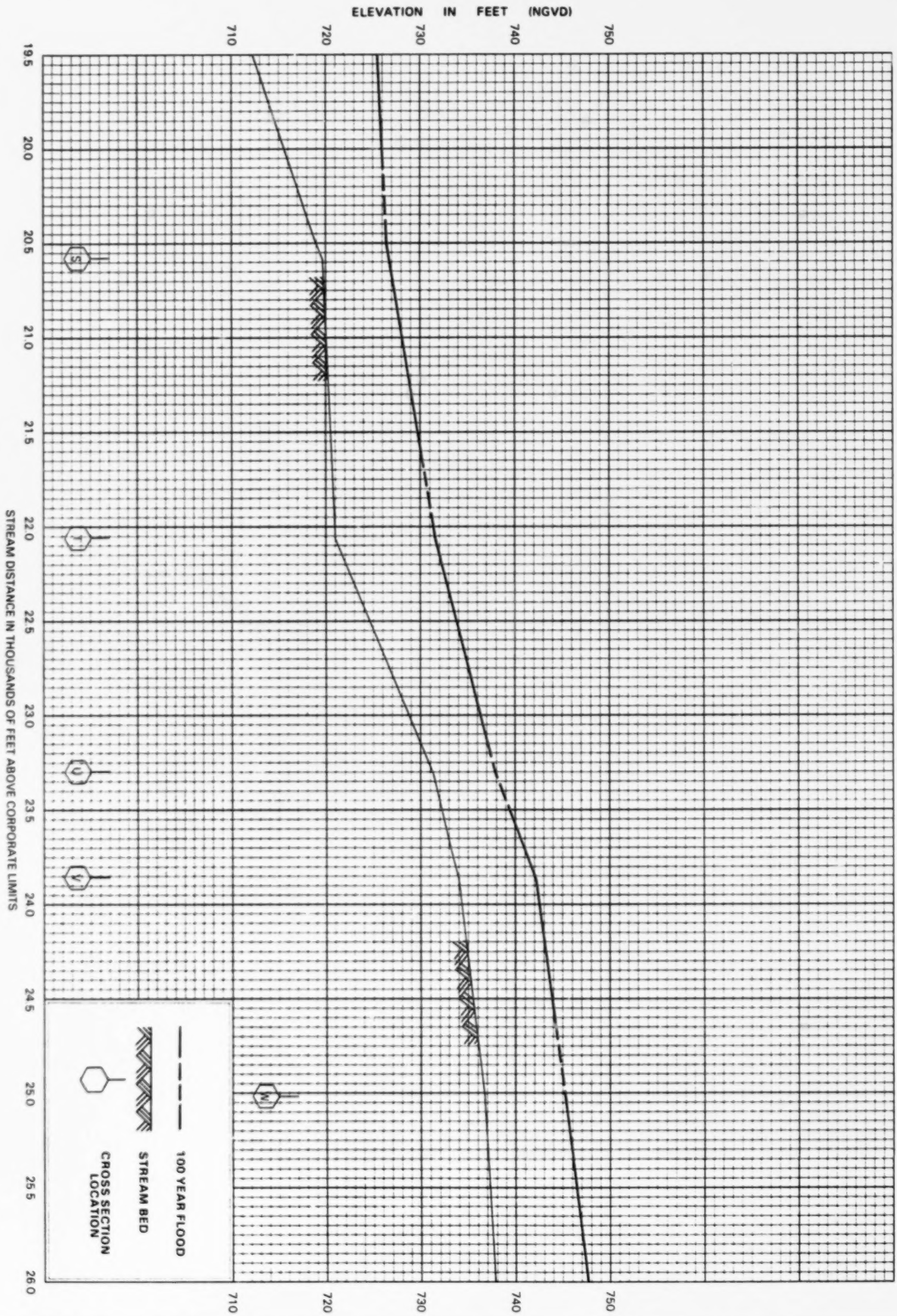
03P

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF PENN, PA
(LYCOMING CO.)

FLOOD PROFILES

MUNCY CREEK



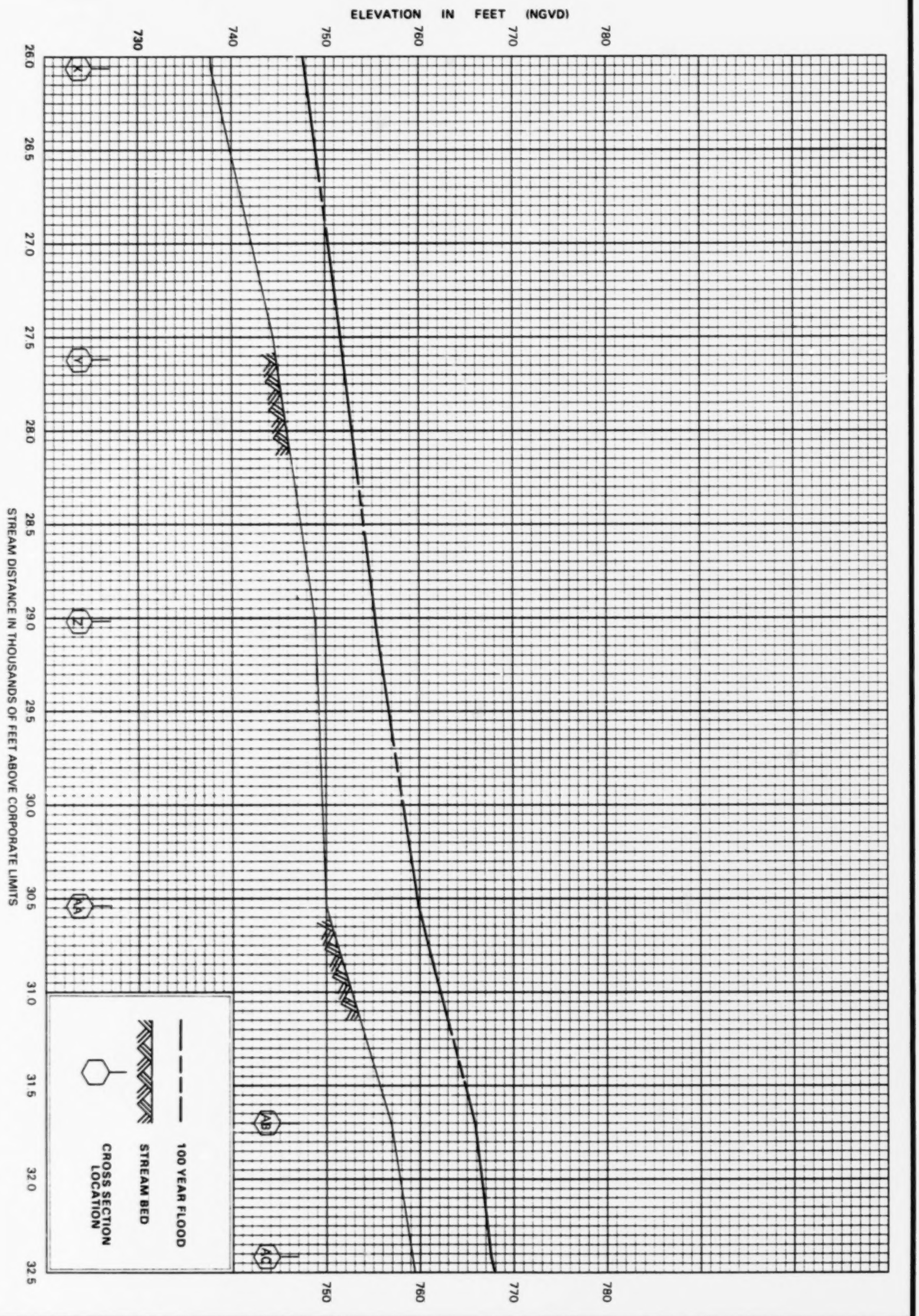
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF PENN, PA
(LYCOMING CO.)

FLOOD PROFILES

MUNCY CREEK

04P



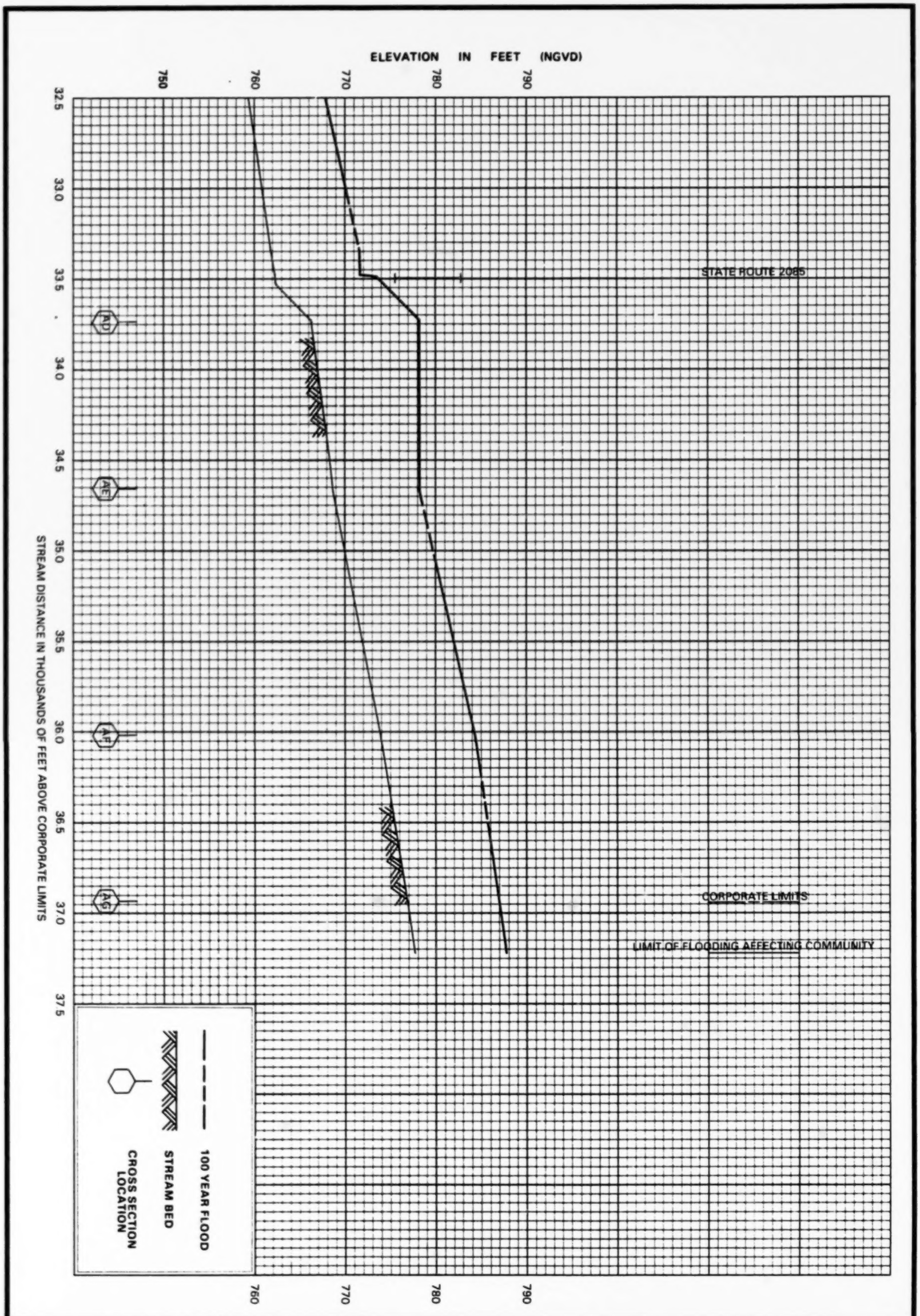
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF PENN, PA
(LYCOMING CO.)

FLOOD PROFILES

MUNCY CREEK

05P



FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF PENN, PA
(LYCOMING CO.)

FLOOD PROFILES

MUNCY CREEK

06P